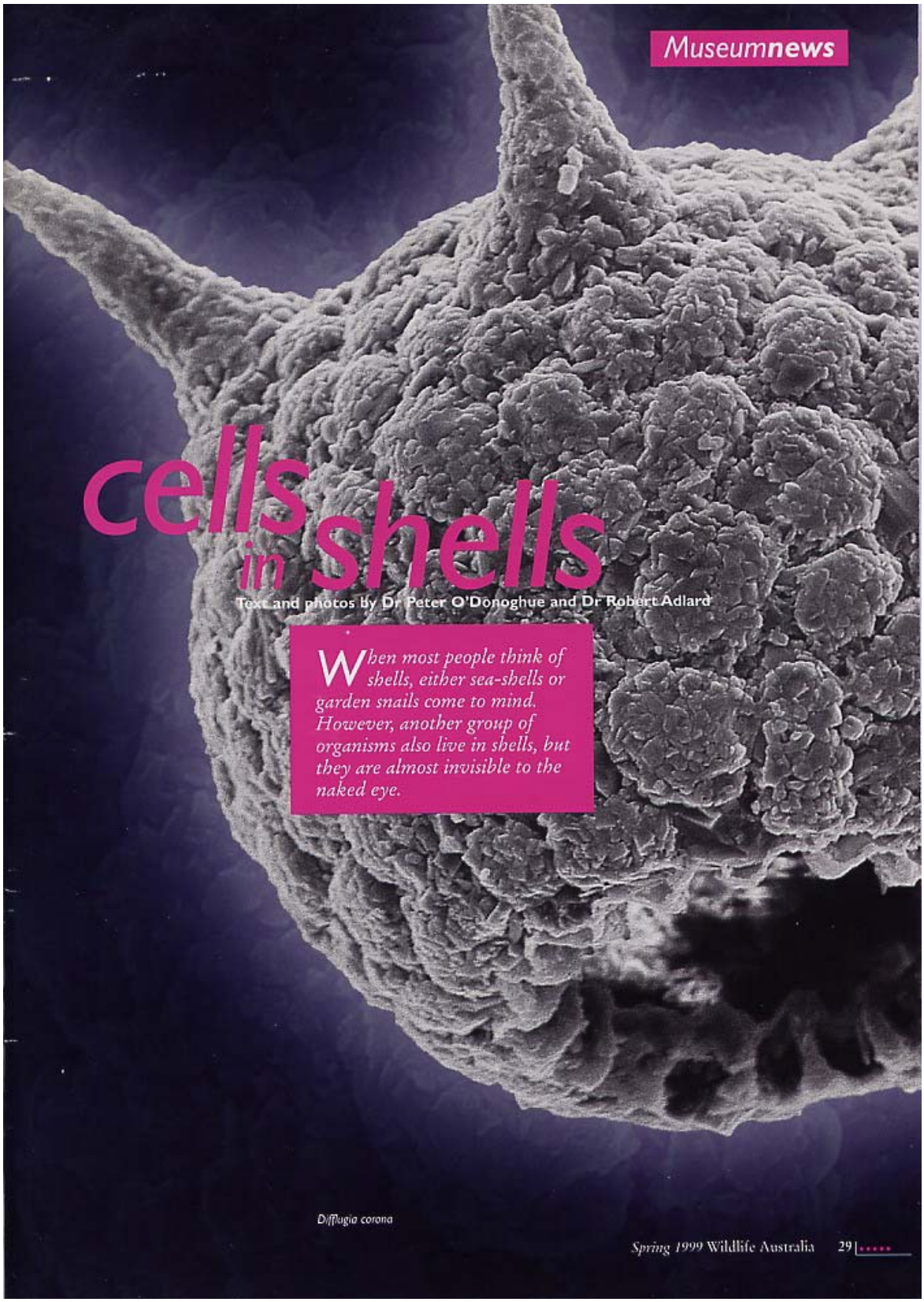
cells in shells

Text and photos by Dr Peter O'Donoghue and Dr Robert Adlard

When most people think of shells, either sea-shells or garden snails come to mind. However, another group of organisms also live in shells, but they are almost invisible to the naked eye.

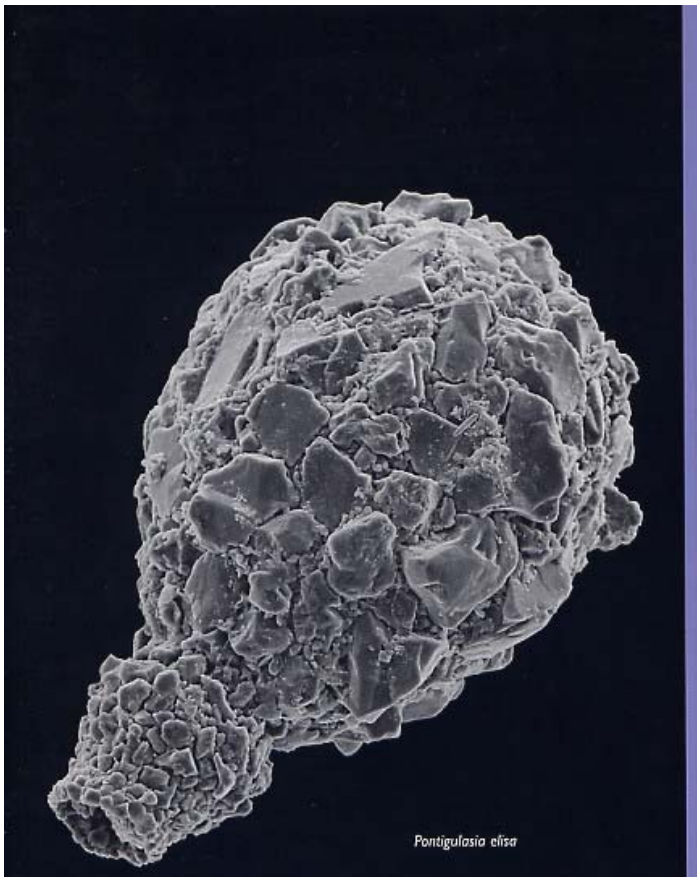


Difflugia corona

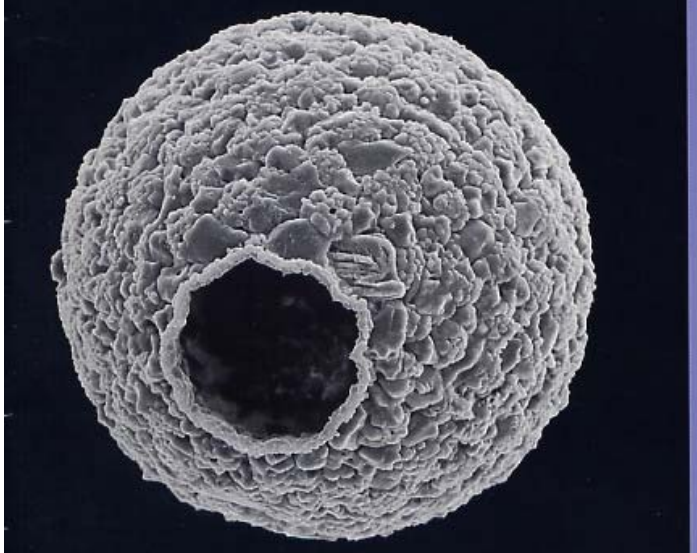
These are the testate amoebae, a fascinating group of microscopic, single-celled organisms that belong to the kingdom Protista. Testate amoebae live in aquatic environments (both freshwater and marine), moist soils and mosses, where they use cellular extensions of their body (pseudopodia) to move about and capture their food, normally a diet of bacteria, fungi and algae. The soft cytoplasm of the amoebae is enclosed within a shell or 'test' to protect it from adverse conditions and predators. Their shells are finely crafted structures whose intricate beauty can only be revealed by microscopic examination.

Lesquereusia spiralis

Quadrulella symmetrica



Pontigulasia elisa



Difflugia tuberculata

Shells of these testate amoebae can be either proteinaceous (e.g. *Arcella* spp.), or agglutinate (e.g. *Difflugia* and *Pontigulasia* spp.) in which the amoeba incorporates quartz grains or diatoms of (microscopic algae) into their tests, in some cases selecting particles of preferred size. Alternatively, agglutinate shells (e.g. *Nebela* spp.) may be derived from the tests of other testate amoebae on which they have fed. Some species form siliceous tests (e.g. *Euglypha, Sphenoderia, Lesquereusia, Cyphoderia* and *Quadrulella* spp.) in which silicon rods, plates or 'scales' form the shell. The morphology of the shell is unique for each species of amoeba, with many species found to have a circumglobal distribution. Currently, more than 150 species have been recorded from eastern Australia.

These miniature marvels of architecture can only be fully appreciated when some idea of their actual size is appreciated. The amoebae depicted on these pages are between 50 and 150 micrometers in length, i.e. 5 to 15 hundredths of a millimetre. When you consider that the average human hair falls within that size range you can start to appreciate their true dimensions.

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